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ABSTRACT

The central purpose of this study was to develop and field test written criterion-referenced tests for the ornamental horticulture component of applied principles of agribusiness and natural resources occupations programs. The test items were to be used by secondary agricultural education students in Florida. Based upon the objectives identified in the "Applied Principles of Agricultural Occupations Curriculum Guide," a list of competencies was compiled. The list was reviewed and modified by a group of teachers, Florida Department of Education regional consultants for agribusiness, and University of Florida faculty at a workshop in 1980. Using the competency statements developed, test items were developed for each competency statement. Items were reviewed and revised by teachers, regional consultants, and University faculty members. The instrument was field tested by administering it to groups of students who had completed applied principles of agribusiness and natural resources occupations programs. As a result of the project, a list of specific competencies and an item bank of multiple choice test items with an answer key was published. Criteria for item selection were developed, based on outcomes of the field test, and recommended for use by teachers selecting items from the test bank. (The competencies and test items for ornamental horticulture make up the bulk of this document.) (KC)

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ED249355

Competency Test Items for Applied Principles of Agribusiness and Natural Resources Occupations

Ornamental Horticulture Component

A Report of Research

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Introduction

The Vocational Education Act of 1963 and the Vocational Education Amendments of 1968 provided the foundation upon which the scope of traditional vocational education programs have been broadened and new programs have been initiated. As a result, vocational agriculture/agribusiness has been characterized by accelerated growth, expanded program offerings, and increased emphasis. For example, in 1967-68, Florida had 229 vocational agriculture/agribusiness departments and employed 284 teachers. According to Kirkland (1979), by the 1978-79 school year the number of departments had increased 62 percent (373 departments) and the number of teachers employed had increased by 103 percent (576 teachers). In the 1982-83 school year, there were 409 departments employing 573 vocational agriculture teachers (Department of Agricultural and Extension Education, University of Florida, 1982).

During this same period of time, there has been an increased emphasis regarding the need to develop and improve approaches for evaluating educational programs. Currently, a great deal of attention is being given to the concept of accountability in education. Effective educational evaluation is vital for improving education programs since it provides the basis upon which to determine the merits of existing programs, the need for new programs, and revision of existing programs.

In this atmosphere of accountability, legislators, educators, and the general public are asking if expenditures for vocational education are producing desired results and funding agencies are asking for evaluative information upon which to base policy decisions. Moreover, a review of the Vocational Educational Amendment of 1976 (American Vocational Journal, 1976) makes it clear that the writers of that

legislation expect evaluations of vocational education programs to yield data and information useful in formulating on-going and future policy and program decisions. However, from a review of a report to the Governor of Florida, it is obvious that sufficient data regarding the effectiveness of vocational education is not available, thus lending further support for the need to investigate this area (Governor's Commission on Secondary Schools, 1983).

In addition, competency-based education is a development receiving considerable attention in the literature and from professional educators. Florida is currently involved in a major effort to implement competency-based vocational education (Harrington, Johnson, Fagan, Freedman, and Reichman, 1976; Fagan and Huckaby, 1982). Using this instructional model, the curriculum is built around objectives that industry recognizes as necessary for employment. In addition, this model places major emphasis on evaluation of educational programs in terms of pre-specified outcomes, requiring that program outcomes be specified in terms of the behaviors, competencies, and performance capabilities expected of students completing instructional programs. Consequently, one measure of program effectiveness is the extent to which students completing or leaving an instructional program possess or fail to possess the behaviors and competencies specified in the instructional objectives. In instructional systems of this nature, test information is not only used to evaluate program effectiveness, but can also be used to evaluate the student's mastery of instructional objectives as an aid to placing students in appropriate employment or in additional instructional situations (Glasser and Nitko, 1971). Instruments or tests designed especially for this purpose are known as criterion-referenced tests (Hambleton and Novick, 1972).

Criterion-referenced tests are defined as tests made up of items keyed to a set of specific behavioral objectives (Ivens, 1970). Others have defined a criterion-referenced test as one that is deliberately constructed so as to yield measurements that are directly interpretable in terms of specified performance standards (Glasser and Nitko, 1971).

Criterion-referenced instruments have not been developed so that program effectiveness and student achievement can be assessed in most areas of agribusiness and natural resources. This activity was designed to develop criterion-referenced tests for the ornamental horticulture component of Applied Principles of Agribusiness and Natural Resources Occupations.

Applied Principles of Agribusiness and Natural Resources Occupations (3720) is primarily designed to be taught at the tenth grade level and students who enroll should have completed Fundamentals of Agribusiness and Natural Resources Occupations (3710) in the ninth grade. Applied Principles consists of three components with each component designed to utilize one-third of the school year (60 days). All students complete the common core component consisting of competencies common to all agricultural/agribusiness occupations. The common core competencies are divided into three instructional areas: agricultural business management; agricultural mechanics; and leadership and citizenship development. Instructors then select two specialized components to complete the Applied Principles course from the following taxonomies: agricultural mechanics; agricultural production; agricultural products; agricultural resources; agricultural supplies and services; forestry; and ornamental horticulture. Each of these components are taught for one-third of the school year (60 days) and these two

components should be selected so as to provide the basic competencies for specialized programs offered at the eleventh and twelfth grade. More detailed descriptive information and specific planning data are available in the publication A Suggested Curriculum Guide for Applied Principles of Agribusiness and Natural Resources Occupations (Panhandle Area Educational Cooperative and Florida Department of Education, 1980).

Purpose

The central purpose of this study was to develop and field test written criterion-referenced tests for the ornamental horticulture component of Applied Principles of Agribusiness and Natural Resources Occupations. In order to achieve this purpose, the following objectives were developed as guidelines for conducting the research:

1. Develop and compile a list of competencies for the ornamental horticulture component of Applied Principles of Agribusiness and Natural Resources Occupations.

2. Develop a criterion referenced test for the ornamental horticulture component of Applied Principles of Agribusiness and Natural Resources Occupations.

3. Field test the instrument in order to determine instrument validity and reliability, and to determine item difficulty, item discrimination, and point biserial correlation for each test item.

Procedure

Objective 1

Based upon the objectives identified in the Applied Principles of Agricultural Occupations Curriculum Guide (Curriculum Materials Center, 1978), a list of competencies was generated and compiled. This list was reviewed and modified by a group of teachers, Florida Department of Education regional consultants for agribusiness, and University of Florida faculty members at a Curriculum Development Workshop held in August, 1980 (Panhandle Area Educational Cooperative and Florida Department of Education, 1980). The competency statements reported in this document have undergone minor refinements in wording since their original publication in 1980. These competencies represent the performance standards relating to Applied Principles that students should master prior to entering specialized programs of agribusiness and natural resources education.

Objective 2

Using the competency statements derived in Objective 1, test items were developed for each competency statement. A consultant staff of teachers, regional consultants, and University faculty members was asked to review and revise the items developed. The consultant staff was specifically asked to accomplish the following tasks:

1. To review and revise individual test items.

2. To make certain that the items were technically accurate.

3. To verify that the item did assess the competency it was purported to address.

As a result of this activity, minor changes were made in the test.

Objective 3

The instrument was field tested by administering it to groups of students who had completed Applied Principles of Agribusiness and Natural Resources Ocupations. The data from the field tests were analyzed for item difficulty, item discrimination, and point biserial correlation. A Kuder-Richardson 20 Correlation was calculated as the measure for test reliability.

Results

The major results of this project were: a list of specific competencies for the ornamental horticulture component of Applied Principles of Agribusiness and Natural Resources Occupations (see Appendix A) and an item bank of multiple choice test items and an answer key for the ornamental horticulture component (see Appendix B).

Summary statistics relative to the ornamental horticulture component of Applied Principles are presented in Table 1. The estimate of reliability of the test by the Kuder-Richardson 20 correlation coefficient was .89.

TABLE 1
Summary Statistical Data Relative to the
Ornamental Horticulture Component of
Applied Principles of Agribusiness
and Natural Resources Occupations

Instructional Area	Factor	Statistic
Ornamental Horticulture	Number of Students Taking Test	33.00
	Total Number of Items on Exam	70.00
	Highest Possible Score	70.00
	High Score	47.00
	Low Score	8.00
	Mean Score	29.21
	Median Score	31.00
	Mode Score	31.00
	Standard Deviation	10.75
	Standard Error of Measurement	3.49
	Kuder-Richardson 20 Correlation	0.89

A complete item analysis for each question in the item bank relative to ornamental horticulture is displayed in Table 2. It may be observed that three statistics are presented: item difficulty; item discrimination; and item point biserial coefficient. Item difficulty (index of difficulty) is defined as the proportion of students who correctly answer an item. The average difficulty of a test is the average of the individual item difficulties. For maximum discrimination among students, an average difficulty of .60 is ideal.

Item discrimination (index of discrimination) is a numerical indicator of how the poorer students answered the item as compared to how the better students answered the item. The scores are divided into three groups with the top 27 percent of the scores in the upper group and the bottom 27 percent in the lower group. The number of correct responses for an item by the lower group is subtrated from the number of correct responses for the item in the upper group. The difference in the number correct is divided by the number of students in either group. The process is repeated for each item.

The point-biserial correlation coefficient is computed for the relationship between a variable for which there are only two categories of scores and a variable for which the scores exist on a continuous distribution. Thus, it is a correlation coefficient indicating the relative degree of relationship between how a student responds to an item and the student's total score on the test.

TABLE 2

Item Analysis of the Item Bank of Questions for the Ornamental Horticulture Component of Applied Principles of Agribusiness and Natural Resources Education

Item Bank Number	Item Difficulty	Item Discrimination	Item Point Biserial Correlation
1	0.85	0.38	0.45
2	0.58	0.50	0.34
3	0.09	0.13	0.08
4	0.73	0.13	0.15
5	0.48	-0.13	0.10
6	0.42	0.13	0.04
7	0.55	0.00	0.05
8	0.27	0.25	0.18
9	0.21	0.25	0.22
10	0.30	0.13	0.20
11	0.42	0.38	0.39
12	0.33	0.38	0.20
13	0.12	0.13	0.03
14	0.39	0.25	0.35
15	0.70	0.63	0.52
16	0.64	0.38	0.45
17	0.79	0.50	0.53
18	0.94	0.25	0.62
19	0.91	0.25	0.47
20	0.73	0.75	0.60
21	0.33	0.63	0.32
22	0.21	0.13	0.20
23	0.00	0.00	0.00
24	0.27	0.25	0.25
25	0.27	0.25	0.25
26	0.21	0.25	0.22
27	0.24	0.38	0.32
28	0.15	0.25	0.16
29	0.82	0.63	0.18
30	0.76	0.63	0.50
31	0.64	0.38	0.51
32	0.76	0.38	0.44
33	0.64	0.50	0.50
34	0.64	0.75	0.52
35	0.39	0.75	0.53

Table 2 (Continued)

Item Bank Number	Item Difficulty	Item Discrimination	Item Point Biserial Correlation
36	0.70	0.50	0.52
37	0.48	0.88	0.55
38	0.61	0.38	0.47
39	0.36	0.63	0.40
40	0.33	0.75	0.50
41	0.42	0.75	0.51
42	0.27	0.38	0.27
43	0.21	0.25	0.18
44	0.18	0.50	0.44
45	0.52	0.63	0.44
46	0.33	0.75	0.45
47	0.42	0.75	0.56
48	0.45	0.38	0.41
49	0.24	-0.13	-0.00
50	0.42	0.00	0.15
51	0.36	0.50	0.32
52	0.09	0.00	0.00
53	0.42	0.50	0.41
54	0.52	0.88	0.59
55	0.12	0.13	0.19
56	0.36	0.38	0.35
57	0.61	0.50	0.48
58	0.35	0.50	0.40
59	0.24	0.25	0.23
60	0.55	0.63	0.44
61	0.30	0.50	0.36
62	0.00	0.00	0.00
63	0.15	0.50	0.38
64	0.39	0.38	0.28
65	0.24	0.50	0.34
66	0.15	0.13	0.12
67	0.42	0.63	0.45
68	0.48	0.50	0.36
69	0.30	0.50	0.34
70	0.36	0.50	0.35

It is recommended that the following criteria be used for selecting items from the item banks for testing purposes:

1. Select items that pertain to the instructional objectives which specify the outcomes sought in the instructional program.

2. Select items that have a positive item discrimination index and a positive point biserial correlation coefficient.

3. Select items that were answered correctly by a substantial percentage of the students as indicated by the item difficulty score.

4. Select items that have high point biserial correlation coefficients thus indicating a relatively high relationship between how a student responds to the item and the student's total score on the test.

Recommendations

Based upon the results obtained from this sactivity, the following recommendations were made:

1. The student assessment test can be used by teachers who are interested in determining how well their students are achieving the competencies that are prescribed for the Applied Principles curriculum. These data should provide a reliable method of determining which instruccional areas need further development or improvement.

2. It is recommended that the criteria, specified in the

2. It is recommended that the criteria, specified in the results section of this document, be used to select items for testing purposes.

3. Research be initiated to assess program effectiveness and student achievement in Applied Principles using a sample of the programs in Florida.

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APPENDIX A

Competencies for the Ornamental Horticulture Component
of Applied Principles of Agribusiness and
Natural Resources Occupations

COMPETENCIES FOR THE ORNAMENTAL HORTICULTURE COMPONENT OF APPLIED PRINCIPLES OF AGRIBUSINESS AND NATURAL RESOURCES OCCUPATIONS

1. The student will formulate a survey of greenhouses and related facilities and outline good housekeeping practices to follow from a selected list of practices.

2. The student will mix soil media according to standards specified by teacher.

3. The student will demonstrate the ability to sterilize soil according to prescribed methods as indicated by the instructor.

4. The student will: (a) develop a management program to maximize production in greenhouse, and (b) identify and list typical houseplants that can be grown within facilities available.

5. The student will prepare soil and a seed bed according to requirements for specific bedding plants.

6. The student will transplant selected plants according to recommended practices.

7. The student will properly identify selected bedding plants.

8. The student will be able to water, fertilize and follow other cultural practices needed for horticultural plants.

9. The student will demonstrate the ability to: (a) propagate plants by seed, cutting, or layering according to specific standards and evaluate the survival rate, and (b) make appropriate grafts and buds and evaluate survival rate.

10. The student will transplant, pot, and care for rooted cultures and seedlings according to accepted standards.

11. The student will demonstrate the ability to follow correct procedures in planting nursery stock.

12. The student will: (a) prepare soil for seeding a lawn, (b) seed and fertilize lawn using appropriate equipment for accurate seeding rate, and (c) develop a management plan for caring for a newly established lawn.

APPENDIX B

Item Bank of Multiple Choice Test Items and Answer Key for the Ornamental Horticultre Component of Applied Principles of Agribusiness and Natural Resources Occupations

Item Bank of Test Items for the Ornament Horticulture Component of Applied Principles of Agribusiness and Natural Resources Occupations

Competency:

The student will conduct a survey of greenhouse and related facilities and outline good housekeeping practices to follow from a selected list of practices.

1. Which of the following practices should be considered when evaluating a greenhouse and related facilities?

   a. Total square feet of greenhouse
   b. Watering system
   c. Storage space for equipment and supplies
   d. All of the above

2. Which of the following safety practices would be the most important, even for a small commercial greenhouse?

   a. Separate equipment storage
   b. Lockable, vented chemical storage locker
   c. A mulched floored shade house
   d. A concrete floored greenhouse

3. Which of the following is (are) an important periodic good housekeeping practice(s)?

   a. Grease equipment
   b. Replace black plastic mulch
   c. Both A & B
   d. None of the above

Competency:

The student will mix soil media according to standards specified by teacher.

4. Which one of the following ingredients would NOT be a good choice for a potting medium?

   a. Perlite
   b. Clay
   c. Vermiculite
   d. None of the above

5. Which of the following tools could be used to mix potting media?

   a. Shovel
   b. Shredder
   c. B only
   d. A & B

6. Which one of the following could be used by itself as a potting media for woody ornamentals?

   a. Sand
   b. Clay
   c. Perlite
   d. None of the above

7. Which of the following would be an adequate potting media for woody ornamentals?

   a. 2 parts sand; 2 parts clay; 1 part peat
   b. 1 part sand; 1 part peat; 1 part perlite
   c. 3 parts sand; 1 part peat
   d. 1 part sand; 2 parts clay; 1 part peat

Competency:

The student will demonstrate the ability to sterilize soil according to prescribed methods as indicated by the instructor.

8. When pasteurizing soil with steam, a soil temperature of 180° is needed for:

   a. 1/2 hour
   b. 1 hour
   c. 1 1/2 hour
   d. 2 hours

9. How many day(s) must soil be aired after treatment with methyl bromide?

   a. 1 day
   b. 7 days
   c. 10 days
   d. 14 days

10. Which of the following materials is critical for potting media and field sterilization with methyl bromide?

    a. Tractor with pressure pump.
    b. Hollow-tined cultivating chisels
    c. Black mulching plastic
    d. Roto-tiller

Competency:

The student will be able to: (a) develop a management program to maximize production in greenhouse, and (b) identify and list typical houseplants that can be grown within facilities available.

11. What is the single largest expense for most greenhouse production managers?

    a. Insurance
    b. Labor
    c. Pots
    d. Fuel

12. The most important expense category for greenhouse managers to consider for maximizing profits is:

    a. Semi-variable costs
    b. Variable costs
    c. Semi-fixed costs
    d. Fixed costs

13. Starting with which of the following planting and germination procedures would require the least amount of labor if the plant is to be marketed in a 6 inch pot?

    a. Peat pellets
    b. Germination flats
    c. 1 inch pots
    d. 3 inch pots

14. Which of the following bench watering systems would potentially be the most efficient?

    a. Solenoid valve and time clock controlling a trickle system
    b. Gate valve controlling a trickle system
    c. Gate valve controlling an overhead mist system
    d. Hand operated hose system

On Questions 15 through 20, identify the houseplant pictured from the list beside it.

15. a. Begonia
    b. Purple Passion
    c. Bromeliad
    d. Wandering Jew

16. a. Snake Plant
    b. Grape Ivy
    c. Prayer Plant
    d. Pathos

17. a. Bishop's Cap
    b. Ribbon Plant
    c. Aloe
    d. Old Man Cactus

18. a. English Ivy
    b. Split Leaf Philodendron
    c. Trailing Peperomia
    d. Umbrella Plant

19. a. Rubber Tree
    b. Dracaena
    c. Magnolia
    d. Dieffenbachia

20. a. Plumosa Fern
    b. Split-Leaf Philodendron
    c. Staghorn Fern
    d. Bromeliad

Competency:

The student will prepare soil and a seed bed according to requirements for specific bedding plants.

21. When sowing medium to large seed for the propagation of bedding plants one should:

    a. Sow the seed lightly in rows
    b. Broadcast seed over the whole seed bed
    c. Sow the seed heavily in rows
    d. None of the above

22. What information should be on germination flat labels for bedding plants?

    a. Expected germination date
    b. Fertilization rate and analysis used
    c. Type of seed and date of sowing
    d. All of the above

23. To prevent the washing-out of seeds, seed flats and containers should be watered by:

    a. Hand with a pitcher
    b. Placing in a tub with 2 inches of water (bottom watering)
    c. A water hose and a mist nozzle
    d. Placing in the mist bed

Competency:

The student will transplant selected plants according to recommended practices.

24. Trees and shrubs should be transplanted:

    a. One half inch lower than in container
    b. Same depth as in container
    c. One inch lower than in container
    d. One inch higher than in container

25. The majority of transplants are killed due to:

    a. Overwatering
    b. Neglect
    c. Underwatering
    d. Too much sun.

26. The depth of the hole for woody transplants should be how much deeper than the height of the roots?

a. 1 1/2 feet
b. 1 foot
c. 1/2 foot
d. 3 inches

27. The width of the hole for woody transplants should be how much wider than the span of the roots?

a. 3 times as wide
b. 2 1/2 times as wide
c. 2 times as wide
d. 1 1/2 times as wide

28. When transplanting established stock, which type of transplants require more prunning?

a. Bare-root plants
b. Balled and burlapped plants
c. Dormant plants
d. Evergreen plants

Competency:

The student will properly identify selected bedding plants.

On Questions 29 through 37, identify the bedding plant pictured from the list beside it.

29. a. Carnation
b. Dusty Miller
c. Petunia
d. Rose

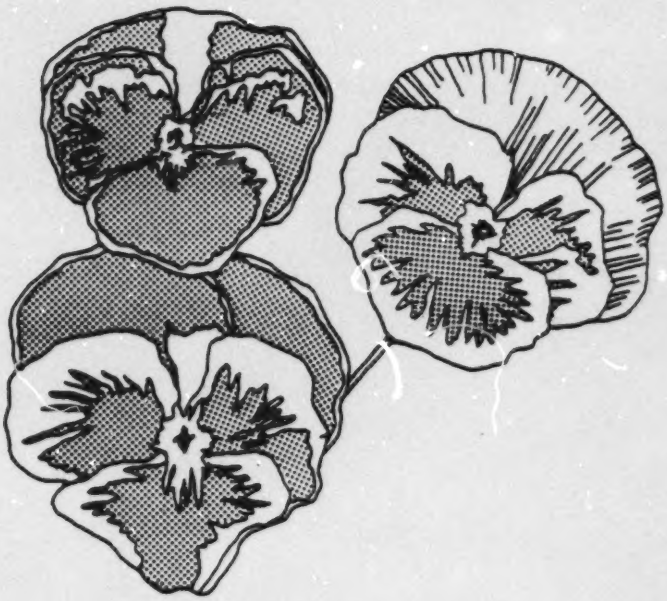
30. a. Begonia
b. Petunia
c. Carnation
d. Caladium

31. a. Pansy
b. Impatiens
c. Chrysanthemum
d. Rose

32. a. Periwinkle
b. Sweet Alyssum
c. Snapdragon
d. Begonia

33. a. Geranium
b. Coleus
c. Petunia
d. Gladiolus

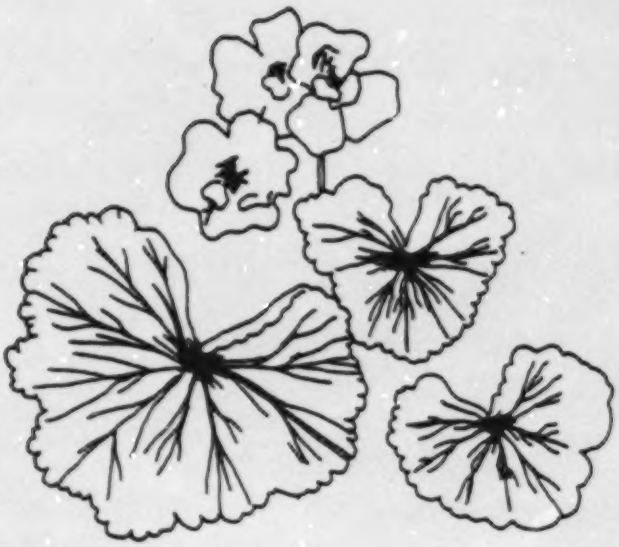
34. a. Periwinkle
b. Caladium
c. Pansy
d. Carnation



35. a. Marigold
b. Periwinkle
c. Dusty Miller
d. Coleus

36. a. Carnation
b. Begonia
c. Chrysanthemum
d. Petunia

37. a. Gladiolus
b. Snapdragon
c. Impatiens
d. Geranium



Competency:

The student will fertilize and follow other cultural practices needed for horticultural plants.

38. The advantage(s) of a drip or trickle watering system in the greenhouse is (are):

    a. Water is supplied to individual containers
    b. Less evaporation and humidity
    c. Less water used
    d. All of the above

39. The most common brand of time release fertilizer used is:

    a. Florida Fertilizer
    b. Covercote
    c. Osmocote
    d. Fertilcote

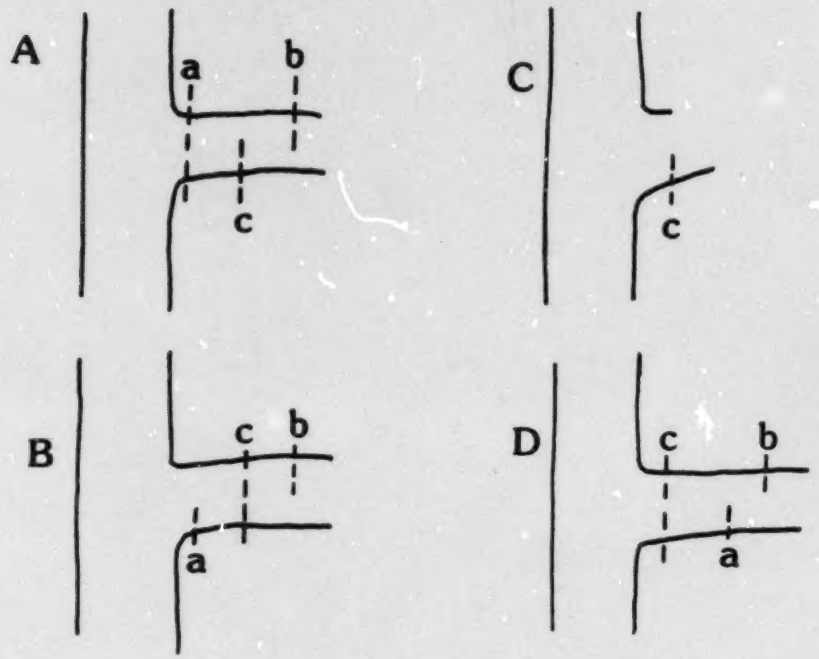
40. What process is performed on herbaceous foliage plants to control, shape, and promote growth?

    a. Pruning
    b. Disbedding
    c. Pinching
    d. None of the above

41. What is the most common method used in Florida for cooling greenhouses?

    a. Top vents
    b. Exhaust fans
    c. Exhaust fans and evaporative pads
    d. None of the above

42. When pruning a large branch, the three cut method should be done in a, b, c order as illustrated in:



43. A properly trimmed hedge should be trimmed:

a. Only during the summer growing season
b. So that is is narrower at the base than at the top
c. So that it is broader at the base than at the top
d. So that its sides are vertical

44. Woody plants trained to grow flat against a wall or fence are called:

a. A trellis
b. A topiary
c. An arbor
d. An espalier

Competency:

The student will demonstrate the ability to: (a) propagate plants by seed, cutting, or layering according to specific standards and evaluate the survival rate, and (b) make appropriate grafts and buds and evaluate survival rate.

45. The genetic characteristics of plants propagated from cuttings:

    a. Are different than the parent plant
    b. Vary from plant to plant
    c. Are the same as the parent plant
    d. Are superior to the parent plant

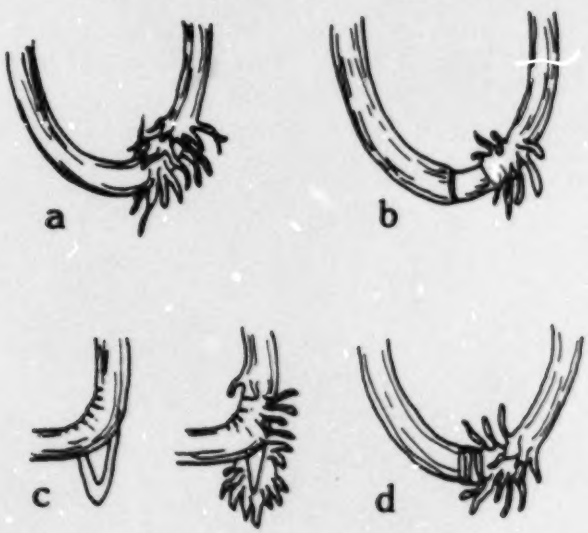
46. A good propagation medium for proper rooting of woody stem cuttings is one that has:

    a. High moisture holding capacity and little air space
    b. Clay and peat for minerals and water holding capacity
    c. High analysis fertilizer added to sand or peat base
    d. High moisture holding capacity and provides some air

47. The proper time(s) to apply rooting compounds to stem cuttings is (are):

    a. To apply solution around cutting after sticking
    b. Immediately before sticking
    c. Soak tips of cuttings 24 hours before sticking
    d. All of the above are equally satisfactory methods

48. Which of the following layering techniques is a stem cut and twist?



49. When sowing seeds in containers with germination mix, small seeds like petunias and begonias should be:

a. Planted in 1 inch furrows
b. Broadcasted
c. Broadcasted and covered with a screened growing mix
d. Planted in expanded peat pellets only

50. The preparation of understock and scion pieces for a whip and tongue graft requires:

a. A sawing action with the budding knife
b. 1 cut each
c. 2 cuts each
d. 3 cuts each

51. A cross section of a properly prepared scion for cleft grafting should be:

a. Wedge shaped
b. Square
c. Rectangular
d. Triangular

52. Can a whip and tongue graft be used when a smaller scion is to be grafted on a larger stock?

a. Yes, if the outside surfaces are aligned on one side.
b. Yes, if the scion is centered in the stock.
c. Yes, if the stock is over 2 inches in diameter.
d. No, both outside surfaces can not be aligned.

53. A specimen tree was completely top worked which required 50 grafts. What is the survival rate if 40 of the 50 grafts lived?

a. 90%
b. 80%
c. 70%
d. 40%

54. If 750 azaleas were potted out of 1,000 cuttings which were placed in the rooting media, what is the survival rate?

a. 7.5%
b. 25%
c. 35%
d. 75%

Competency:

The student will transplant, pot, and care for rooted cultures and seedlings according to accepted standards.

55. The process of transplanting seedlings sown in open flats to give greater growing space and allow proper plant development is called?

    a. Heading back
    b. Damping off
    c. Pinching off
    d. Pricking off

56. Seedlings should be transplanted from open flats when they develop their:

    a. Cotyledons (seed leaves)
    b. First true leaves
    c. Seed root
    d. Tap root

57. Applying water early enough in the day so that the seedling leaves dry before nightfall will help prevent:

    a. Heading back
    b. Damping off
    c. Pinching off
    d. Pricking off

58. Before transferring seedlings from indoors to uncertain outdoor climate they should be:

    a. Hardened
    b. Pinched back
    c. Heavily watered
    d. Heavily fertilized with water soluble mixture

59. When transplanting rooted cuttings, how should they be removed from the rooting media?

    a. Pulled with the index finger and thumb
    b. Lifted from underneath with fingers, pencil, or trowel
    c. Washed out gently
    d. None of the above

60. When transplanting rooted cuttings, why should they be kept in the upright position and transplanted immediately?

a. To keep soil on roots
b. To prevent the roots from being exposed to air and drying
c. To prevent the tops from being broken
d. All of the above

Competency:

The student will demonstrate the ability to follow correct procedures in planting nursery stock.

61. The standard method for transplanting large shrubs and medium and large trees from the ground to a landscape site without exposing their root system is called?

a. Spading
b. Digging
c. Banding
d. Balling and Burlapping

62. When transplanting with the soil ball intact, how do you handle trees and shrubs?

a. Primary branches
b. Base of trunk
c. Main trunk and primary branches
d. Soil ball

63. When transplanting with the soil ball intact, what is commonly used to fasten the cloth material around the soil ball?

a. Rope
b. Box nails
c. Bailing wire
d. Sewn cord

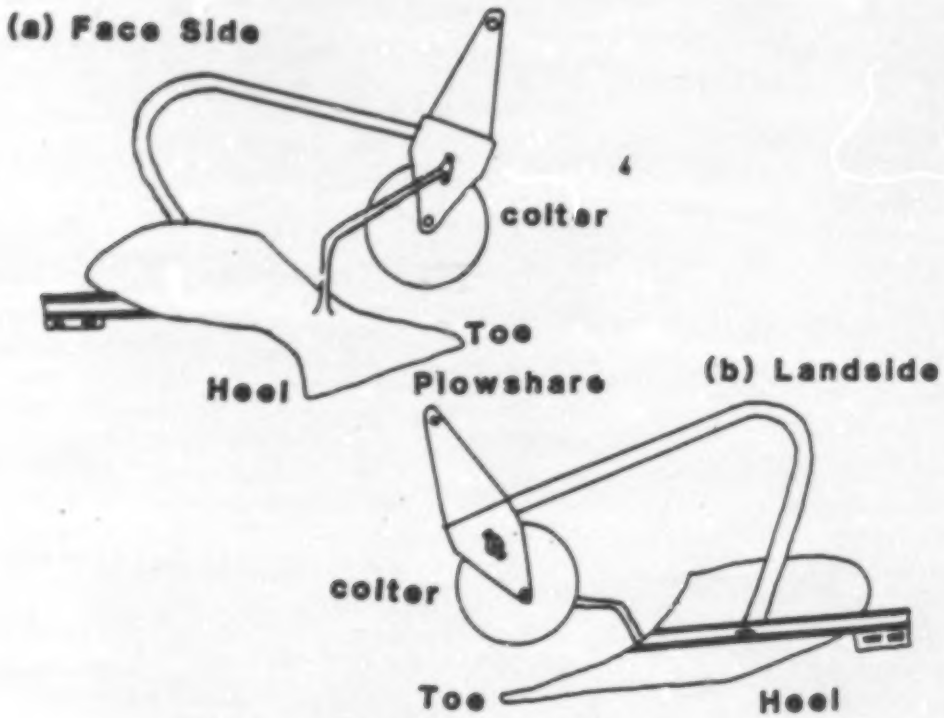
Competency:

The student will: (a) prepare soil for seeding a lawn, (b) seed and fertilize lawn using appropriate equipment for accurate seeding rate, and (c) develop a management plan for caring for a newly established lawn.

64. What is the first step in the task for preparing soil for seeding a lawn?

a. Choose proper plowing pattern
b. Service tractor and implements
c. Adjust plow
d. Adjust disk

Refer to the following diagrams to answer Questions 65 through 67.



65. If the toe of the plowshare is closer to the furrow wall than the heel is:

a. The plow will run to the left
b. The plow will run to the right
c. The plow is adjusted properly
d. None of the above

66. If the landside is not as nearly verticle as possible, the plow may fail to:

a. Run straight, by running left
b. Run straight, by running right
c. Run at desired depth
d. Completely turn the plow slice

67. If the toe of the plowshare is lower than the heel, the plow will:

a. Not stay deep enough
b. Tend to plow too deeply
c. Not plow straight
d. Not completely turn the plow slice

68. Which of the following factor(s) affect the rate of seeding?

a. Type of grass
b. Desired thickness of stand
c. Soil moisture and fertility
d. All of the above

69. When should maintenance procedures begin on warm season grasses?

a. Soil temperature 40 - 45°F (4 - 8°C)
b. Soil temperature 60°F (15°C)
c. Soil temperature 80°F (25°C)
d. Atmospheric temperature 80°F (27°C)

70. Which of the following mower(s) should be purchased for highest quality cut?

a. Reel mowers
b. Rotary mowers
c. Both of the above
d. None of the above

ANSWER KEY

Ornamental Horticulture Component

1	D
2	B
3	A
4	B
5	D
6	D
7	B
8	A
9	C
10	C
11	B
12	B
13	D
14	A
15	A
16	C
17	C
18	B
19	A
20	C
21	A
22	C
23	B
24	B
25	A
26	B
27	C
28	A
29	A
30	D
31	C
32	C
33	D
34	C
35	B
36	D
37	D
38	D
39	C
40	C
41	C
42	D
43	C
44	D
45	C
46.	D
47.	B
48.	C
49.	B
50.	C
51.	A
52.	A
53.	B
54.	D
55.	D
56.	B
57.	B
58.	A
59.	B
60.	D
61.	D
62.	D
63.	B
64.	B
65.	A
66.	D
67.	B
68.	D
69.	B
70.	A